Coma Morphology of Comet Hyakutake (1996 B2) Using Narrowband Imaging

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Data for morphological studies of Comet Hyakutake (1996 B2) was obtained from Lowell Observatory. Narrowband filter images of the comet were taken on the nights of Mar 23-25, 1996, the weekend of closest approach. Central wavelengths of the filters include 3871Å (CN), 4060 (C_3), 4260Å (CO+), 4845Å (Cont), 5139Å (C_2), 6840Å (Cont), 7025Å (H_2O +) as well as a wideband R filter. The images, taken with the Hall 1m telescope, have a scale of $.72''$/pixel ($4.8'$ per side) or 1.92×10^5km/pixel at closest approach. Further, we obtained images on the nights of Mar 29-30 with a wide–field Takahashi .2m telescope using the same narrowband filters. These images form a complementary set to the earlier images as they have a scale of $7.76''$/pixel ($51.7'$ per side). 20 pixels in the Takahashi images (Mar 30) covers the entire 1m closest approach field of view.

In order to investigate the detailed morphology present in the coma of Hyakutake, we performed a sequence of procedures designed to remove the gross, overall fall–off of material with increasing distance from the nucleus. After bias subtracting and flat–fielding, the images were shifted, trimmed, and normalized to assist in intercomparisons. Mean, azimuthally–averaged radial profiles were determined for each bandpass on each night. These were used to create radially symmetric models. We then ratioed each processed image by the model created for its corresponding filter. The results show underlying details including temporal changes and sunward–tailward assymmetries. For instance, continuum images clearly show a a sunward–moving blob of material ejected once per rotation of 6.24 hours. The gas images show a similar but less prominent structure moving away from the nucleus which may be due to the underlying continuum present within those filters. In addition, the tail's brightness can be more than twice as high as the sunward blob in the continuum images, but very little sunward/tailward brightness difference exists in the CN images. These and other details will be presented and discussed.

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